

AY

27

## Managing Draining Wounds And Fistulae: New And Established Methods

*Katherine F. Jeter, EdD, ET*

*Tess E. Tinile, BSN, CETN*

*Mark Chariker, MD*

Patients with draining wounds and fistulae present an enormous challenge to the healthcare team. Draining wounds secondary to malignancy or infection require containment, infection control precautions, and nursing management to protect skin integrity and to obviate offensive odor. In many cases, patients and their families must be taught to care for wounds if definitive treatment is delayed until the patient stabilizes or if the patient is unresectable, as in a terminally ill cancer patient. The comfort, compassion, and creativity of nurses in such situations may be the family's only pleasant memory of a nearly unbearable situation. Today, new foam and non-adherent dressings, absorbent gels, and pouching systems offer a variety of management alternatives for the most extensive wounds in the most difficult sites. In addition, deodorants taken internally and environmental deodorizers that neutralize rather than mask odors have eased the burden for patients with draining wounds and for caregivers. Innovation and determination are required to develop affordable collection devices or dressings for chronic draining wounds. The cost-benefit of the management procedure is just as important to

families and institutions as patient comfort and skin integrity.

The morbidity and mortality associated with enterocutaneous fistulae are universally recognized.<sup>1-6</sup> Fistulae usually result from infection, obstruction, trauma, carcinoma, radiation, and Crohn's Disease. Spontaneous closure is impeded or prevented by these same factors and distal obstruction, presence of a foreign body, disruption of bowel continuity, malnutrition, and the "maturation" of the mucocutaneous opening.

The complexities of incisional and cutaneous fistulae are most successfully managed with the collaborative efforts of surgeons, ET nurses or surgical nurse specialists, and nutrition support personnel. Quantitative and qualitative analysis of fistula drainage, radiographic localization of fistula(e), appropriate treatment of sepsis, nutritional supplementation, management of the cutaneous aspect of the wound, and local skin care are of equal import.

While surgeons and radiologists identify the etiology and site of the fistula and maximize the potential for spontaneous closure,

nursing management requires attention to skin protection, patient comfort, odor control, patient mobility, drainage containment, accurate measurement of effluent, and cost containment.<sup>6</sup> Denuded skin and malodorous dressings may be as debilitating to the patient as the electrolyte disturbances and other sequelae of fistula. Since the advent of enterostomal therapy (ET) nursing at the Cleveland Clinic in the 1950's, many draining wounds and fistulae have been managed with ostomy pouches. In recent years, several manufacturers have developed sophisticated wound drainage collectors that allow easy access to the wound and connection to gravity drainage if necessary. ET nurses' ingenuity and skills are most impressive when large draining wounds present themselves.<sup>7-9</sup>

The following chapters will present practical and innovative methods for wound evacuation and containment. Beyond the challenge and the satisfaction of surmounting the technical dilemmas associated with gaping wound defects, irregular anatomical contours and adjacent retention sutures, drains, and tubes, it is important to recognize that healing rates are accelerated when skin integrity is preserved and wounds are kept clean, moist, and warm.

### **A Closed Suction Wound Drainage System to Enhance Management of Incisional and Cutaneous Fistulae**

At Spartanburg Regional Medical Center, a closed suction wound drainage system has been devised that (1) is effective in collecting drainage from the most difficult sites, (2) appears to enhance wound closure, (3) obviates skin damage, (4) minimizes nursing requirements, and (5) dramatically reduces the cost associated with conventional dressings and containment.<sup>9,10</sup> Variations of this system have been described by Montgomery, Betancourt, and

Everett, but these clinicians have not described a dressing that conforms to the wound bed.<sup>11-13</sup> This conformation, combined with moist wound healing principles, is critical to fistula closure and wound contraction.

Perhaps the most important facet of the closed suction wound drainage system is the continuous evacuation of effluent from the wound bed. This, in conjunction with an occlusive dressing, maintains optimal tissue hydration, preventing necrosis and eschar formation, which are mechanical barriers to wound healing.<sup>14</sup> While these results can only be compared to the results of traditional methods of management, it is believed that an increased rate of granulation and re-epithelialization is seen with the closed suction wound drainage system.

### **Materials and Methods**

Collaboration between the surgical staff and the enterostomal therapy (ET) service begins when the fistula is detected. The ET nurse becomes responsible for the initial placement of the closed suction system and for scheduled changes with wound re-assessment.

The following dressing package has been developed:

- One Jackson-Pratt Mini-Snyder Flat Hemovac drain
- One 2X2 gauze square
- 4X4 non-sterile gauze squares
- Normal saline
- Skin-sealant (e.g., Bard Barrier Film, Skin-Prep, etc.)
- Transparent film dressing (e.g., Accu-Derm, Bioclusive, Opraflex, Op-Site, Tegaderm, etc.) to seal the wound site
- Stomahesive Paste
- Pink waterproof tape
- Continuous suction system (wall or Emerson)

The closed wound drainage system is created in the following manner. (See Figures 1 through 11 for illustrations of this procedure.)

1. Irrigate the wound bed thoroughly with normal saline using a 30 ml syringe with a 19-gauge needle.
2. Moisten one 2X2 gauze square with normal saline. Open completely and lay across the wound bed.
3. Place Jackson-Pratt drain in wound bed. Shorten the fenestrated drain as necessary so that the flat drain is confined to the wound bed. *The drain is never placed in the fistula tract.* In the case of fistula drainage at skin level, the fenestrated portion of the drain is simply centered over the cutaneous opening. It may be helpful to encircle the cutaneous wound with a pectin-based skin barrier in order to create a "trough" in which to situate the fenestrated drain.
4. Saturate 4X4 gauze squares with normal saline. Open and fluff into wound to completely cover the drain and fill the defect to skin level. In the case of a cutaneous fistula, only enough moist gauze to cover the flat fenestrated drain is required.
5. Apply skin sealant (Bard Barrier Film, Skin-Prep, etc.) to all skin that will be covered by the film dressing. Allow to dry until slick.
6. Cut the film dressing or select a size to allow at least 1 inch of intact skin beyond the wound edges. Place the film dressing over the packed wound. Carefully crimp the adhesive film dressing around the Jackson-Pratt tube to seal.
7. "Caulk" the tube exit site with a small amount of Stomahesive Paste where the film dressing is crimped around the tube. This ensures air-tight closure.
8. Reinforce this site with waterproof "pink tape" as illustrated.
9. Turn your attention now to the connection of the Jackson-Pratt to continuous suction. (Do not attempt to use the bulb of the Jackson-Pratt system.) With some brands of cannister and tubing, all that is necessary is to cut the funnel end off the tubing and the small J-P tubing will fit snugly into the larger lumen tube. The junction should be taped securely with pink tape. Otherwise you may use a small "Christmas tree" connector or cannibalize IV tubing to get a small plastic adapter to connect the tubing.
10. Turn on continuous suction to the upper range of the low setting (approximately 60 to 80 mmHg) and observe the wound site. The dressing should contract noticeably. If it does not, the system is not closed and wound drainage will not be efficiently removed. When this occurs, fistula drainage will accumulate, causing skin damage and leakage outside of the dressing. Another indication that you have not obtained a closed suction system is a whistling sound indicating that the dressing is not air-tight.

The closed suction system is changed and the wound bed is cleansed every three to five days, depending on the viscosity of the effluent and the surgeon's desire to examine the wound. The cost of materials (charged to the patient) to establish this system and maintain it for one week is approximately \$205. Conventional dressings, such as abdominal pads, gauze sponges, and tape changed four to six times a day, may cost as much as \$1400 per week. This amount does not include the cost of bed linen changes and nursing time. No price can be placed on a patient's suffering from malodorous dressings, frequent disturbances for dressing changes, and the discomfort associated with denuded skin, which frequently occurs with uncontrolled wound drainage. Availability of nurses for



Figure 1. Cleanse wound with normal saline.

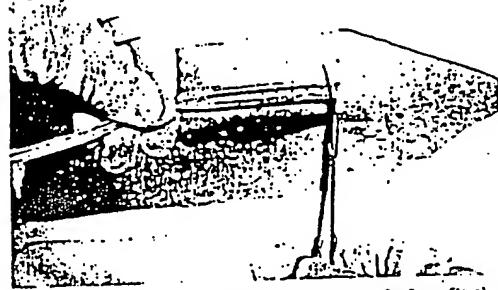


Figure 3. Trim fenestrated drain as needed to fit the wound.



Figure 5. Fluff wet gauze over fenestrated drain.



Figure 7. Cover with transparent film dressing. Crimp around tube at site where it exits dressing.

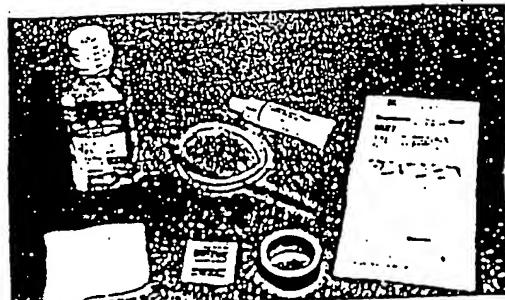


Figure 2. Assemble materials.

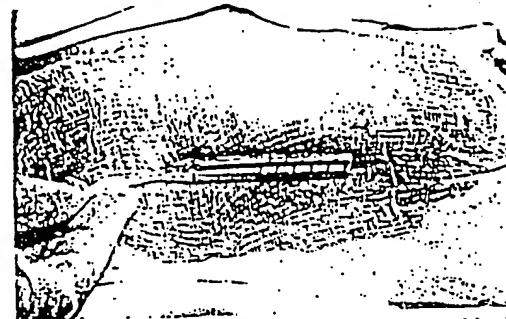


Figure 4. Open moistened gauze to line wound bed. Place fenestrated drain in wound.



Figure 6. Prepare surrounding skin with skin sealant.



Figure 8. "Caulk" tube exit site with pectin-based paste.



Figure 9. Seal exit site with pink tape and attach to wall suction. Notice contraction of dressing materials that conform to wound bed when system is air-tight.



Figure 10. Traditional gauze and non-woven dressings for draining wounds may cost as much as \$1,400 per week.



Figure 11. Maximum cost to patient's account for closed suction wound drainage system is \$205 for the first week and less thereafter.

more important tasks in critical care units is an added benefit of the closed suction wound drainage system.

#### Patient Profile

Several patients presented noticeable challenges that warrant description. A

42-year old white male was transferred to the hospital's intensive care unit with 13 plastic retention sutures from xiphoid to pubis. A small bowel fistula was located in his midline defect. The skin beneath and around the retention sutures was inflamed and denuded. There were Penrose drains in both upper and lower quadrants. After thorough cleansing of the damaged skin and the retention sutures using a Water-Pik (because the syringe and needle procedure was inadequate for a wound of this magnitude), a Jackson-Pratt drain was threaded underneath the retention sutures along the midline wound defect. A wet gauze covering was threaded through to cover the drain. The entire abdominal surface was then covered with film dressing, encasing the retention sutures. Closed suction was achieved as described previously. The patient was comfortable, the skin healed, and the fistula closed in seven days.

In the case of a patient with a renal fistula after a partial nephrectomy, the use of an ostomy pouch would have been impossible because of the size and location of the incision. Furthermore, the staff would have been unable to ascertain the amount of urine loss with leaking pouches or conventional dressings. In fact, it was concluded during the first three days of management with the closed suction wound drainage system that all of the urine produced by the left kidney was draining from the flank. Once the fistula closed, the flank healed rapidly, the wound contracted, and only a small narrow scar remains. This patient had a small bowel fistula located in a midline wound defect that developed after a laparotomy for exploration of multiple abdominal abscesses. This fistula was managed in the same fashion and it closed in 11 days. In addition to these two draining wounds, the patient had a urostomy and a colostomy, both of which required pouches.

There would have been no space on the abdomen for a third pouching system.

In several patients, it was necessary to cut larger holes in the Jackson-Pratt drain and to irrigate the drain periodically when the fistula effluent thickened. It is critical to remind staff nurses to assess the closed suction system for patency several times during each shift. If it becomes clogged, it must be irrigated and restarted very quickly to prevent the wound drainage from accumulating in the dressing material and leaking. Once leakage has occurred, it is important to remove the entire dressing and start from the beginning.

All of the patients in which the closed suction wound drainage system was used were very sick and required a great deal of time and attention. None of the fistulae had an output greater than 800 ml per 24 hours and most had an output of 500 ml or less per 24 hours. All patients were managed on TPN. The closed wound drainage system enables nurses to attend to the more critical elements of care. Generally, all that is required of the nurse is maintenance of careful records of the fistula's output and, in some patients, periodic irrigation.

### Discussion

Bernard first demonstrated the toxic effects of digestive secretions on living tissue.<sup>15</sup> Our clinical observations suggest that fistula effluent does inhibit wound healing. For this reason, we advocate continuous suction and find it superior to intermittent suction and gravity drainage with ostomy or wound management pouches. With the damp overlay gauze sponge, the wound bed will tolerate continuous low suction and the efficiency of the drainage system is maintained because the fenestrations are not occluded.

The combination of an occlusive dressing with the suction system effectively prevents tissue dessication and necrosis. By minimizing the inflammatory response, fibroplasia is reduced. This, we believe, encourages rapid wound contraction and re-epithelialization.<sup>16</sup>

In order to take advantage of epithelial migration, minimal wound manipulation is advocated. We have noted that necrotic tissue is autolytically debrided, usually within 72 hours of implementing the closed suction wound-drainage system. When the wound is completely clean, dressing changes should be restricted to every three to five days. During the time the dressing is in place, if the closed suction system becomes clogged, normal saline is used to irrigate the system until it is patent.

When the dressings are removed after several days, there is a characteristic odor that is particularly disturbing to surgeons. It is important that the medical team not overreact to the smell or appearance of the dressing material. The wound should be assessed on the basis of cleanliness after it has been irrigated with normal saline delivered via a 30 ml syringe with a 19-gauge needle.<sup>17</sup> Solutions such as 3% hydrogen peroxide, 1% povidone-iodine, 0.25% acetic acid, or 0.5% sodium hypochlorite are not used because it is believed that their cytotoxic effects on fibroblasts have the potential for inhibiting wound closure.<sup>18</sup> Because draining wounds are clean-contaminated, aseptic technique is not suggested. Nonsterile dressing material is used on these wounds and, when the dressing is changed, the drain is washed with an antiseptic soap and reused. As the wound contracts, it is necessary to shorten the drain to fit the wound bed.

## Summary

This closed suction wound drainage system has revolutionized the management of difficult draining wounds in our institution. It has been invaluable for patients with enteric fistulae, a urinary fistula in a deep flank incision, a cutaneous lymph fistula, and an enteric fistula deep in a perineal wound. It is far more effective in our hands and less cumbersome than other techniques we have used that are described in the literature.

We now prefer the closed suction wound drainage system for patients with all types of fistulae, unless the effluent is too thick to be evacuated by continuous low suction. Beyond the simplified management of this clinical headache, the significant benefits of the closed suction wound drainage system are its encouragement of fistula closure with optimal wound healing, the remarkable comfort it affords patients, and the dramatic cost savings to our institution.

## References

1. McIntyre PB, Ritchie JK: Management of enterocutaneous fistulas: A review of 132 cases. *Br J Surg* 71:293-296, 1984.
2. Allardice BD: Management of small bowel fistulae. *Am J Surg* 145:593-596, 1982.
3. Kurtz RS, Heiman TW: The management of intestinal fistulas. *Am J Gastroenterol* 76:377-379, 1981.
4. Fischer JE: The physiology of enterocutaneous fistulas. *World J Surg* 7:446-450, 1983.
5. Fujita G, Shoji M: Management of postoperative gastrointestinal fistulas. *World J Surg* 5:743-745, 1981.
6. Irrgang S: Management of the enterocutaneous fistula. *J Enterostom Ther* 11(6):211-225, 1984.
7. Fowler E, Jeter K, Schwartz A: How to cope when your patient has an enterocutaneous fistula *AJN* 80(3):426-429, 1980.
8. Tonn J: Management of fistula care with a wound drainage collector. *J Enterostom Ther* 15(2):87-90, 1988.
9. Tintle T: Effective management of incisional and cutaneous fistulae with a closed suction wound drainage system. Poster Session Sponsored by Marion Laboratories. Washington, DC, June 7, 1989.
10. Chariker, et al: Effective management of incisional and cutaneous fistulae with closed suction wound drainage. *J Contemporary Surg* 34(6):59-63, 1989.
11. Montgomery BA: Easy dressing of large, draining abdominal wounds using moisture vapor-permeable film. In: *Techniques for Surgeons* (O'Leary JT, Woltering EA, eds). Wiley and Sons, New York 1985; 417-418.
12. Belancourt S: A method of collecting the effluent from complicated fistula of the small intestine. *SG&O* 163:375, 1986.
13. Everett WG: Wound sinus or fistula? In: *Wound Care*. William Heinemann Medical Books Ltd., London 1985; 84-90.
14. Rovee DT, Jurowsky CA, Labun J: Effect of local wound environment and epidermal healing: Mitotic response. *Arch Dermatol* 106:330-334, 1972.
15. Leibovich SJ, Ross R: Macrophage-dependent factor that stimulates the proliferation of fibroblasts *in vitro*. *Am J Pathol* 84:501, 1976.
16. Alper JC, Tibbets L, Sarazan S: The *in vitro* response of fibroblasts to the fluid which accumulates under a vapor permeable membrane. *J Invest Dermatol* 84:513-515, 1985.
17. Rogness H: High-pressure wound irrigation. *J Enterostom Ther* 12:27-28, 1985.
18. Lineaweaver W, Howard R, Soucy D, et al: Topical antimicrobial toxicity. *Arch Surg* 120:267-270, 1985.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**